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Title: CANINE AND FELINE IMMUNOREGULATORY PROTEINS, NUCLEIC ACID MOLECULES,

AND USES THEREOF Inventor: YANG, SHUMIN

• SEQ ID NO: 4, 6, 7, 8, 9, 11, 18 and 19

- + Oligo search for SEQ ID NO: 4, 6, 7, 8, 9, 11, 18 and 19
- SEQ ID NO: 5 and 10 (PRT).

Prioriy Date: 5/29/1998

Thanks

S.Kaushal

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Canine interleukin-13: molecular cloning of full-length cDNA and expression of biologically active recombinant protein.

Yang S, Boroughs KL, McDermott MJ.

Heska Corporation, Fort Collins, CO 80525, USA. shumin.yang@maxygen.com

Interleukin-13 (IL-13) regulates immune responses mediated by type 2 T helper lymphocytes (Th2) in the human and mouse. To study the function of this cytokine in the dog, we have isolated a cDNA that encodes the full-length canine IL-13 (CaIL-13) precursor polypeptide of 131 amino acids. CaIL-13 shares significant homology with the IL-13 amino acid sequences of cattle (54.1%), mouse (39.6%), and rat (36.6%) but shares the highest identity with human IL-13 (HuIL-13) (61.8%). The predicted CaIL-13 mature polypeptide of 111 residues was expressed in bacteria, and recombinant CaIL-13 (rCaIL-13) was isolated from inclusion bodies and refolded. rCaIL-13 stimulated the proliferation of TF-1 cells, which are derived from human erythroleukemia cells and respond to IL-13 as well as to a number of other human and murine cytokines. CaIL-13 mRNA was readily detectable by reverse transcriptase-polymerase chain reaction (RT-PCR) in cells from lymph nodes and peripheral blood. The gene sequence and biologically active recombinant protein for CaIL-13 will be useful reagents to determine the role of IL-13 in the regulation of canine immune responses.

PMID: 11032397 [PubMed - indexed for MEDLINE]

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Three residues in the common beta chain of the human GM-CSF, IL-3 and IL-5 receptors are essential for GM-CSF and IL-5 but not IL-3 high affinity binding and interact with Glu21 of GM-CSF.

Woodcock JM, Zacharakis B, Plaetinck G, Bagley CJ, Qiyu S, Hercus TR, Tavernier J, Lopez AF.

Division of Human Immunology, Hanson Centre for Cancer Research, Institute of Medical and Veterinary Science, Adelaide, South Australia.

The beta subunit (beta c) of the receptors for human granulocyte macrophage colony stimulating factor (GM-CSF), interleukin-3 (IL-3) and interleukin-5 (IL-5) is essential for high affinity ligandbinding and signal transduction. An important feature of this subunit is its common nature, being able to interact with GM-CSF, IL-3 and IL-5. Analogous common subunits have also been identified in other receptor systems including gp130 and the IL-2 receptor gamma subunit. It is not clear how common receptor subunits bind multiple ligands. We have used site-directed mutagenesis and binding assays with radiolabelled GM-CSF, IL-3 and IL-5 to identify residues in the beta c subunit involved in affinity conversion for each ligand. Alanine substitutions in the region Tyr365-Ile368 in beta c showed that Tyr365, His367 and Ile368 were required for GM-CSF and IL-5 high affinity binding, whereas Glu366 was unimportant. In contrast, alanine substitutions of these residues only marginally reduced the conversion of IL-3 binding to high affinity by beta c. To identify likely contact points in GM-CSF involved in binding to the 365-368 beta c region we used the GM-CSF mutant eco E21R which is unable to interact with wild-type beta c whilst retaining full GM-CSF receptor alpha chain binding. Eco E21R exhibited greater binding affinity to receptor alpha beta complexes composed of mutant beta chains Y365A, H367A and I368A than to those composed of wild-type beta c or mutant E366A. These results (i) identify the residues Tyr365, His367 and Ile368 as critical for affinity conversion by beta c, (ii) show that high affinity binding of GM-CSF and IL-5 can be dissociated from IL-3 and (iii) suggest that Tyr365, His367 and Ile368 in beta c interact with Glu21 of GM-CSF.

wild-type beta c or mutant E366A. These results (1) identify the residues Tyr365, His367 and He368 as critical for affinity conversion by beta c, (ii) show that high affinity binding of GM-CSF and IL-5 can be dissociated from IL-3 and (iii) suggest that Tyr365, His367 and He368 in beta c interact with Glu21 of GM-CSF.

PMID: 7957082 [PubMed - indexed for MEDLINE]

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PEFERENCE [(bases 1 to 1658) AUTHORS Yang, S., Sellins, K.S., Weber, E. and McCall, C.

TITLE Canine interleukin-5: molecular characterization of the gene and

Mammalia; Eutheria; Carnivora; Fissipedia; Canidae; Canis.

Hukaryota; Metaloa; Chordata; Craniata; Vertebrata; Euteleostomi;

expression of biologically active recombinant protein

JOURNAL J. Interferon Cytokine Res. 21 (6), 361-367 (2001)

1334408 METLIME 11440633 FUBMED

FEFERENCE (bases 1 to 165%)

AUTEOF.S Yang, 3.

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Prospect Parkway, Ft Collins, CO 80525, USA

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	1021	ctcgtaagca	tttatttttc	attaatcatt	tcatttatat	catttgtaac	accontagt
-	1081	aattatataa	acatcattta	cttatggtaa	ttatagctta	gtataaggtg	gtttcccacc
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//							

Revised: July 5, 2002.

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Mar 6 2003 11 06 61







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```
☐ 1: AF331919. Canis familiaris ...[g1:15919180]
```

Links

```
LOCUS
             AF331919
                                        610 bp
                                                  mRNA
                                                          linear
                                                                    MAM 04-OCT-2001
DEFINITION
             Canis familiaria interleukin-5 mRNA, complete cds.
             AF331919
ACCESSION
VERSION.
             AF331919.1 GI:15919180
KETWORDS
SOURCE
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  OF.CANTISM
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             Eukaryota; Metaloa; Chordata; Craniata; Vertebrata; Euteleostomi;
            Mammalia; Euthe:ia; Carnivora; Fissipedia; Canidae; Canis.
REFERENCE
             1 (bases 1 to r10)
  AUTEORS
             Yang, S., Bellin, K.B., Weber, E. and McCall, C.
  TITLE
            Canine interleusin-5: molecular characterization of the gene and
             expression of biologically active recombinant protein
  JCUENAL
             . Interferon Cytokine Res. 21 (6), 361-367 (2001)
            133442
  MELLINE
   EUBMED
              144663
FEFERENCE
              (bases 1 to +1))
  AUTEORS
             Yang, S.
  TITLE
            Direct Submission
            Submitted (22-DEC-2000) Immunology, Heska Corporation, 1613
  JOURNAL
             Prospect Parkway, Ft Collins, CO 80525, USA
FEATURES
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                      1..610
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☐ 1: AF331920. Canis familiaris ... [gi:15919182]

Links

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DEFINITION
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ACCESSION
VERSION
            AF331920.1 GI:15 19182
KEYWOF.DS
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SOUPCE
  OF GALLISM
            Caris familiaria
            Hukaryota; Metado:; Chordata; Craniata; Vertebrata; Euteleostomi;
            Mammalia; Eutreria; Carnivora; Fissipedia; Canidae; Canis.
PEFFFFICE
             : (bases 1 to 46:)
            Yand, S. Pelling, F.S., Weber, E. and McCall, C.
  AUTHORS
            Canine interlaudin-5: molecular characterization of the gene and
  TITLE
            expression of biologically active recombinant protein
  JCTFNAL
            7. Interferon Cytokine Res. 21 (6), 361-367 (2001)
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             1440633
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FEFERENCE
            . (bases 1 to 465)
            Yar.g,S.
  AUTHORS
  TITLE
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BASE COUNT
                          -9 J
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      121 agacettgae actgetetee acteategaa ettggetgat aggegatggg aacetgatga
      181 ttoctactor tgaaaataaa aatraccaar tgtgcattaa agaagttttt cagggtatag
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      301 ottitaataaa uguudadata gaudgodaaa aaaaaagutu tgoaggauaa agatggagad
      361 taabaaaatt ootaaantab otaraadtat tiotiiyyitat aataaana'in qadigqahan
```



NCBI Conserved Domain Summary

New Search

PubMed

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Protein

Structure

CDE

Taxonomy

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RPS-BLAST 2.2.5 [Nov-16-2002]

Query= gi [909090 gc [AA01 []] \hat{g} .] As 200900_1 interleukin=5 [Canis familiaris]

(134 letters)

Database: cdd.v1.60

gnl CDD 8195

10,013 PSSMs; 2,494,783 total columns

Click on boxes for multiple alignments



Show Domain Relatives

• .. This CD alignment includes 3D structure. To display structure, download **Cn3D**!

PSSMs producing significant alignments:

Score E (bits) value

1 55W13 producing significant anginitents.

pfam02025, IL5, Interleukin 5

186 7e-49

• gnl CDD 8195, pfam02025, IL5, Interleukin 5.

CD-Length = 108 residues, 99.1% aligned Score = 186 bits (473), Expect = 7e-49

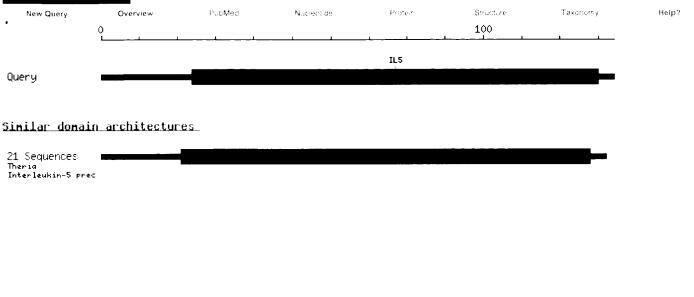
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Sbjct:	2	PMSALVKETLALLSTHRTLLEGNETLRTPVPTHKNHOLGTEFTFOGTDTLKNGTAOGGAV	61

Query: 85 DKLFQNLSLIKEHIERQKKRJAGERWBVTKFLDYLQVFLGVINTEWT 131 Sbjct: 62 ETLFQNLSLIKKYIDRQKKKGGEERRRVKQFLDYLQEFLGVINTEWT 108

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CDART: Conserved Domain Architecture Retrieval Tool



Result page: Previous 1 Next

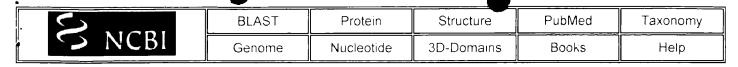
Subset by Taxonomy

Subset by selected domains:

pfum02025

Interleukin 5.

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Query: gi|15919183 interleukin-5 [Canis familiaris] Matching gi: 15919181

Best hits	Common Tree	Taxonomy Report	3D structures	CDD-Search	GI list				
22 BLAST hits to 18 unique species Sort by taxonomy proximity									
1 Archaea	Bacteria 22 Me <u>ta</u>	zoa 🚺 Fungi 🚺 Plants 🛭	Viruses O Other	Eukar <u>yotae</u>					
Keep only	▼ (Cut-Off 100 Select	Reset						

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<u>հակահահահահահահատահահահահահա</u>	SCORE	F ACCESSIO!	<u>GI</u>	PROTEIN DESCRIPTION
	591 3	23 AAC 545)	32.18519	interleukin-5 [Felis catus]
	<u> 585</u> .	.3 A <u>AC.27.51</u> .	3 <u>3 3 4 4 3 4 2</u>	interleukin 5 [Felis catus]
*************************************	573 .	:1 <u>2AB 38</u> 332:	44013.1/	Interleukin 5 [Sus scrofa]
	571 .	6 / <u>AE45 111</u>	<u> 56901 4</u>	interleukin-5; IL-5 [Canis familiaris]
	<u> 567</u> I	$1 - AAB \setminus 1 $	1 313334	interleukin-5 [Equus caballus]
	<u>551</u>			interleukin-5 [Bos taurus]
	536 1			interleukin-5 [Cvis aries]
	468 .	3 AACH5711	<u>. 2961971</u>	interleukin-5 [Felis catus]
	<u>448</u> 1	1 A <u>AK-CHG</u>	: <u>15217532</u>	interleukin-5 [Saimiri sciureus]
	<u> 430</u> 1			B cell differentiation factor I [Homo sapi
	429 .			interleukin 5
	<u>425</u> _			interleukin-5
	424 1			B cell differentiation factor I [Homo sapi
	<u>413</u> .			interleukin-5 [Cavia porcellus]
	<u> 386</u> .:			interleukin-5 [Sigmodon hispidus]
	<u>386</u> 2			interleukin 5
	<u> 374</u> .:	1 <u>CAA1960</u>	<u>527686</u>	IL-5 [Mus musculus]
	<u>370</u> .:			interleukin-5 [Macropus eugenii]
	<u>359</u> .:			interleukin 5 [Fattus rattus]
	<u> 352</u> .:			interleukin-5 [Rattus norvegicus]
	<u>349</u> 2			Chain A, Mol_id: 1; Molecule: Interleukin-
***************************************	<u> 108</u> 2	0 <u>AAD37461</u>	<u>5006324</u>	interleukin-5 [Sminthopsis macroura]